INTERGENERATIONAL CONFLICT AND PUBLICLY PROVIDED GOODS

By

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This dissertation is dedicated to my husband, Peter Thompson.

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This dissertation explores the ways in which intergenerational conflict can affect the provision of publicly provided goods that are consumed by people in specific age groups, such as public education and Medicare. Many factors can influence the relative redistribution of government resources toward the various age groups. I examine this redistribution at both the local and national levels.

At the national level, I examine how demographic change affects Congressional voting on aging issues. I used demographic data from the 1990 Census and vote records of individual members of the House of Representatives from 1986 to 1998 to examine how demographic changes in the constituencies of Representatives, and particularly changes in the age distribution of the constituencies, affected how the Representatives voted on issues specific to age. Redistricting is used as a natural experiment, and allowed me to separate the effects of changes in demographics from the individual inclinations of the various members of Congress. I offer evidence that politicians are indeed Representatives, responding to changes in the demographic makeup of their districts.

At the local level, I explored the effects of elderly migration on the public provision of education. Previous research offered mixed evidence about the effect of the elderly on education spending, but consistently showed that racial differences between the older and younger cohorts had a strong negative effect on education spending. The elderly preferred higher education spending if they felt a sense of connection to their communities, particularly to the youth in those communities. As a result, long-time elderly residents or those who migrated only a short distance are more likely to support education.

I used 5-year migration data from the U.S. Census to explore this idea, in a model controlling for the possible endogeneity of elderly migration with respect to education spending. I found that education expenditures are higher when a larger fraction of the elderly has lived in the same county for at least 5 years, but are lower when the elderly who do migrate are from farther away. I also found cross-cohort racial heterogeneity to have no significant effect on education spending.

CHAPTER 1
INTRODUCTION

The government provides goods and services for many different groups in society. These groups are not taxed differentially by their preferences on public spending, but their preferences vary. Therefore, these various groups must compete for government resources. A conflict exists between generations because different services exist for different age groups; examples include education and welfare and nutrition programs aimed specifically to aid children, and Medicare and other programs for the elderly. The mix of programs chosen reflects the characteristics of the population. Therefore, changes in the demographic composition of the population may have far-reaching effects on the mix of services provided by the public sector.

According to the 2000 Census, just over 12% of the American population is currently aged 65 or higher. By the year 2030, this proportion is expected to rise to nearly 20%. As America continues to age, it is likely that interest in issues affecting older citizens will increase. Two of these important issues are how the voting behavior of legislators in a representative democracy changes when constituent demographics change; and how the increasing elderly population will affect spending on public education.

Most of the literature to date on intergenerational conflict has addressed Social Security and education finance. The Social Security literature has concentrated on the viability of the system in the face of the booming retiree population and possible reforms (Baker and Weisbrot 1999 and Schultz 1995).

A growing literature has concentrated on education finance issues. The literature on intergenerational conflict and education expenditures gives mixed hypotheses and evidence on the effects of change in the proportion of older people on education expenditures. If the two cohorts, children and the elderly, are competing for resources, it would seem that a higher proportion of older constituents would cause fewer votes for services for children. However, altruism may mitigate this tendency, as Logan and Spitze (1995) point out. Poterba (1998) argues that increased spending on education may decrease crime, which increases the utility of the elderly; other cross-generational effects could include the improved level of services, such as health care, the elderly enjoy with a better-educated younger cohort. It is feasible that cross-generational effects could hold for children's issues other than education. This would be particularly true where altruism exists. However, antipoverty and other programs for children could act to reduce crime and improve services for the elderly in much the same way as improved education, so altruism need not be present. Kemnitz (2000) models Social Security and public education expenditures, and finds that population aging may increase the Social Security contribution rate as well as educational expansion.

The empirical evidence is also mixed. Poterba (1997) finds that older voters do not support increases in state education expenditures. Furthermore, he finds that, if the elderly and children in a state are of different races, the elderly do not support education spending. Ladd and Murray (2001) perform a similar analysis at the county level and find the fraction of elderly to have no effect on education expenditures. Harris, Evans and Schwab (2001) get a similar result in a district-level analysis, and suggest that this may be because local education expenditures are capitalized into housing prices. However, the latter two sets of authors find the same strong negative effect of cross-

cohort racial heterogeneity as Poterba. It is possible that this is due not to a racial bias in the elderly, but that the race variables are capturing a "connectedness" between the generations.

This sense of connection forms the basis of the analysis of Chapter 3. The elderly do not enjoy the direct benefits of public education, unlike families with children. Other researchers including Poterba (1998) and Kemnitz (2000) have discussed the external benefits of education that might make the elderly more willing to improve it. These include decreased crime, a higher level of services such as health care, and increased Social Security contributions from the better educated younger cohort. In the real world, though, the elderly will not live to enjoy these external benefits of paying to improve education now. For example, improving a child's education now may make him less likely to commit crimes now, but the effect presumably (and hopefully) extends to the child's full lifetime. If this is the case, the elderly will not live long enough to benefit from the cumulative reduction in crime. The immediate gains to the welfare of the elderly will be small; thus, the elderly should be unwilling to fund education.

Altruism would mitigate this tendency. Following Becker's (1981) work on the economics of the family, grandparents are very likely to support those children who mean the most to them: their grandchildren. If grandparents living in the same locale as their grandparents shift the position of the median voter, this will lead to higher spending on education. Once we are outside the confines of the family, however, the literature does not explain why we might be more altruistic toward some people than others.

I propose that the extent to which we are altruistic depends on how connected we are to the beneficiaries of our good will. Charity begins at home, and then extends to others. That is, if the elderly subscribe to the idea that "it takes a village to raise a child,"

they will also act to help other children who are part of their village --- close to them in a geographic sense or with whom they identify in some other way.

It may also take time for people to identify with their communities; if this is the case, they will become more altruistic with longer residence. If recent residents of a community maintain some sense of connection to their previous residence, support for education among the elderly should be highest where more of the elderly are long-time residents (i.e. moved a distance of zero); and lowest where more of the elderly have moved in from far away.

Chapter 2 examines how demographic change affects Congressional voting on aging issues. In a simple majority-voting scheme bills would be passed which would reflect the demographic makeup of the area. Abstracting from differential voting participation rates between age groups, we would expect to see more elderly-friendly bills in places where more elderly people reside, and fewer bills passed which would provide goods and services to children; the opposite should hold true where there are relatively more families with children. However, in the United States we have a representative government to make most decisions about public expenditures. Do politicians respond to varying demographic characteristics of their constituent bases, or do they vote according to their own preferences?

I use demographic data from the 1990 Census and vote records of individual members of the House of Representatives from 1986 to 1998 to examine how demographic changes in the constituencies of Representatives affect how the Representatives vote on issues specific to age. Of particular interest is how changes in the age distribution of the constituencies affect voting behavior. The 1992 redistricting of

the House of Representatives is used as a natural experiment to isolate and examine these effects.

Redistricting provides us with multiple observations on demographic variables for individual lawmakers. We can examine how a Representative's voting patterns might change on issues related to demographic characteristics, such as age, when his constituent demographics change. This allows me to separate the effects of changes in demographics from the individual inclinations of the various members of Congress.

The analyses in Chapter 2 offer evidence that Representatives do indeed respond to changes in the demographics of their constituencies. When a larger proportion of the constituency is made up elderly people, legislators are more likely to vote to support redistribution toward the elderly. Similarly, when a larger proportion is made up of children, legislators are more likely to vote to support redistribution toward children. However, cross-effects do not hold, where having a large population of one age group would make a Representative less likely to vote for redistribution toward the competing group.

One possible explanation for this is cross-generational altruism. The results of Chapter 3 show that cross-generational altruism can have important effects on the provision of age-specific, publicly provided goods. In particular, if a larger fraction of a county's elderly has lived in that same county for a period of 5 years or more, education spending is higher in the county. The elderly who migrate from another state or county, however, are less willing to support education. These results indicate that connection to the community, and members of the competing cohort who reside in the community, can affect support for redistribution to the competing cohort.

CHAPTER 2
OUT WITH THE OLD, IN WITH THE NEW? CONGRESSIONAL VOTING PATTERNS, INTERGENERATIONAL CONFLICT AND DEMOGRAPHIC CHANGE

To my knowledge, there are no analyses of the determinants of Congressional action on aging issues. This chapter employs exogenous demographic change at the appropriate level of aggregation to investigate changes in Congressional voting behavior.

Inman (1987) summarizes the models addressing the competition of various groups for resources and resulting representative voting behavior. Among these models, Downs' (1957) median voter model is perhaps the best known. Demographic change will not necessarily change the position of the median voter, but if it does, the model predicts that changes in voting bebavior sbould result. Other models concentrate on the relative sizes of the competing groups, positing that sbifts in the relative group sizes should translate to changes in voting. For example, Preston (1984) sbows that government transfers depend on the political power of the cohort, witb a larger cohort getting higher transfers. He suggests that this partially explains tbe increased well-being of the elderly and decreased well-being of cbildren from 1960 to 1980.

The House of Representatives is made up of 435 members. Each state's districts must be of equal size, so population shifts result in the various states redrawing their district boundaries. After each Decennial Census, each state redraws its Congressional districts in accordance with these Federal guidelines and the state's own constitution. For the 1990 Census, redistricting occurred after the 1992 session.[1]

[1] A small amount of additional redistricting occurred in 1994; this analysis does not consider any effects this might have on voting behavior.

Redistricting provides us with multiple observations on demographic variables for individual lawmakers. We can examine how a legislator's voting patterns change on issues related to demographic characteristics, such as age, when his constituent demographics change. As you see below, the 1992 redistricting caused significant change in the variables of interest for many individual lawmakers, creating a convincing natural experiment.

There have been a few recent treatments in the political economy literature of the effects of demographic change on Representatives' voting behavior. Stratmann (2000) and Rothenberg and Sanders (2000) use redistricting to analyze the effects of exogenous demographic change. Stratmann finds that, if more than half of the district changed in the post-1990 redistricting, there was a greater absolute change in the Representative's Americans for Democratic Action (ADA) index. Stratmann's primary focus is on the shifting voting records of Representatives over the span of their careers, however, not on demographic change. His empirical modeling of redistricting is somewhat limited because of his construction of the explanatory variable for redistricting. Stratmann visually inspected each district map and recorded redistricting as "yes" if it appeared that the district boundaries changed by 50% or more, and "no" otherwise. This measure is not subtle enough to capture changes in voting behavior that result from smaller changes in district boundaries. Stratmann's measure for the change in constituency preferences due to redistricting is the percentage of electoral vote for Clinton in 1992 less the percentage for Dukakis in 1988. This is problematic because there were likely differing preferences for these 2 candidates that were not due to redistricting, and possibly other changes over time for which Stratmann does not control.

Stratmann also finds that as the district's median household income increases the ADA falls; that is, voting becomes more conservative. His income measure is the change in median household income from 1980 to 1990 in the reapportioned districts relative to the districts not reapportioned. However, this again does not control sufficiently for changes which occurred over time, as income changed for everyone over the course of the decade. Changes in income and voter preferences as measured by the difference in the district's Democratic vote cannot adequately capture the districts' changing preferences for specific types of issues, such as those affecting the elderly.

Rothenberg and Sanders find that, if redistricting caused a shift in the liberalness of the district, a greater ideological shift in Representatives' voting records resulted. Their measure of liberalness is single-dimensioned: the change in percentage of the two-party vote for Dukakis in the district before and after redistricting.

The advantage of my approach to redistricting is that it can capture subtle changes due to minor adjustment of the district boundaries. In addition, my explanatory variables address many potential dimensions of preference, rather than liberalness alone. My use of only 1990 Census data, divided up by Congressional district before and after the boundary changes, means that there are no changes in the variables at the aggregate level for which I must adjust.

If lawmakers' voting patterns reflect the demography of their constituents and if intergenerational conflict is an issue, we should observe the relation

vote on elderly issue = f(constituent age, income, fraction children in district, W)

where W is a vector of controls for other demographic variables including gender and educational attainment.

Census Data

Data for this analysis are taken from the 1990 Census. These data were aggregated from the census tract level to the Congressional district level for both the 102^{nd} and 103^{rd} Congresses.[2] This provides us with a set of demographic data for each legislator before and after the most recent redistricting.

The variables of interest in this analysis are primarily those related to age and income, as they should capture any conflict between the generations. [3] The proportion of the population aged 55 and older is used as the measure of older residents because people are forward-looking to some extent. While most people do not retire until they reach their 60s, people start to care about aging related issues somewhat earlier than that. A 55-year-old probably does not have minor children, so should be less concerned with children's issues. Fifty-five is also the age at which people are eligible to receive certain age-related perks, such as senior citizen bank accounts and the ability to live in adult-only housing communities. Eligibility for membership in the American Association of Retired Persons (AARP) begins at 50.

The proportion of the population aged 18 or less is used to measure the proportion of children in a district. Although education programs largely affect children above the age of 4, the parents of infants are expected to be forward-looking for 4 years. Other programs for children, such as welfare, begin at birth.

Each district's average per capita income is used as the income variable. Since per capita income will be lower in areas with a higher proportion of children, ceteris

[2] Special thanks are due to Alex Hooper for his most able assistance in constructing the Census dataset.

[3] Proportions (e.g., fraction female and fraction children) are used to normalize districts. Although districts tend to be rather uniform in size, there are some differences across states. This is particularly the case in states with small populations, such as Alaska, Vermont and Wyoming, which have only 1 Congressional district.

paribus, household or family income might be better measures. This relation could cause bias in the coefficients for the income and interaction terms. However, per capita income is highly correlated with family and household income and it is expected that such bias will be small. Alternative income measures will be investigated in future studies of this paper. The other variables are intended as controls, and include the proportion of women and fraction of the constituency with a college degree.

The combination of redistricting and the 1992 elections brought about sweeping changes in the composition of the House of Representatives, leaving only 322 Representatives who were in both the 102nd and 103rd Congresses. Table 2-1 shows summary statistics of interest for the constituencies of these 322, including the pre-redistricting levels and mean, standard deviation, minimum and maximum proportional changes in the variables.

Table 2-1 Summary statistics: changes in demographic variables

Variable	Obs.	Value before redistricting	Proportion changes: Mean	Std. dev.	Minimum	Maximum
Per capita income	322	14,214	0.0383	0.1488	-0.5715	0.9284
Fraction aged < 18 years	322	0.2458	-0.0019	0.0139	-0.0891	0.0515
Fraction aged 55 or older	322	0.3018	0.0015	0.0205	-0.0676	0.1218

Each of the proportional changes in the key variables has a standard deviation larger than the mean. This suggests that there is sufficient variation for identification of the effects of these changes. For example, the district's per capita income changed by more than one standard deviation from the mean change for 64 of the 322 legislators. The changes in the variables of interest for Florida's Representatives are shown in Table 2-2 to illustrate how some Representatives' constituencies changed.

Table 2-2 Changes in demographic variables for Florida's Representatives

Representative	Per capita income	Fraction aged 55 and over	Fraction aged less than 18
Bacchus	.0244	.0621	-.01015
Bilirakis	.0782	-.0164	.0007
Gibbons	.0102	-.0156	-.0012

Goss	-.0628	-.0264	.0137
Hutto	.0436	.0020	-.0016
Johnston	-.0877	.0290	-.0140
Lewis	.0024	.0208	-.0184
McCollum	.0254	-.0095	-.0206
Peterson	.1290	-.0064	-.0009
Ros-Lehtinen	-.0264	-.0143	-.0061
Shaw	.2886	.1218	-.0613
Stearns	.0515	-.0587	.0356
Young	-.0909	.0068	-.0005

Voting Index

I created a database of votes on all the bills related to aging issues from 1987 to 1998; that is, 6 years before and after redistricting changes went into effect. Each legislator's vote on each bill is recorded in the *Congressional Quarterly Almanac* (CQA). I studied the descriptions given by CQA for every bill in the period of my study to determine which votes were relevant. Votes were included if they were substantially about aging issues, but this was a more difficult process than it might seem. Many votes, while they include some provision for the elderly, have a variety of other provisions as well. Most of the votes concerning Medicare, for instance, also include various other budget items. One example is vote 84 from 1990, a substitute amendment to the Fiscal 1991 Budget Resolution, which included Medicare cuts of $3.2 billion, but also froze the budget for defense programs and discretionary domestic programs. Most of the other votes in this session concerning the budget resolution do not mention Medicare cuts, and this vote does in large part concern Medicare. For these reasons, this vote was ultimately included in the database.

Sometimes it was even difficult to determine whether a vote was pro-elderly. For example, the 1988 Medicare Catastrophic Coverage Act was largely repealed in 1989. Vote 268 of 1989 was an "amendment to repeal…all stop-loss coverage of hospital and doctor bills…while retaining broad prescription drug coverage and non-

Medicare provisions." This allowed slightly more coverage for Medicare patients than the previous vote, so I was unable to determine whether voting "yes" on this bill would be pro-elderly. It was ultimately excluded from the index for this reason. Similar issues came up in other situations, such as when Medicare cuts were being argued. If a legislator suggested a sizeable Medicare cut that was still smaller than the previous suggestion, I was unable to record a "yes" vote as "pro" or "anti." I also excluded votes where there was less than 20% contention; many of these votes would otherwise have been perfect additions to the index. The final list of votes included is in the Appendix.

The Appendix shows that there were only 2 votes on elderly issues in 1991, none in 1992, 2 in 1993 and 1 in 1994. In order to have a reasonable number of observations for each Representative, I also excluded those legislators whose first observation was after 1990 or whose last observation was before 1994. The remaining sample consists of 276 legislators. For each of these I created an "elderly-friendly" index for the periods before and after redistricting. This index is a simple average of "pro-elderly" and "anti-elderly" votes. "Pro" votes were assigned a value of 1 and "anti" votes a value of 0; thus, an index value of 1 indicates a lawmaker always voting pro-elderly. The following table contains the summary statistics for the voting index for the entire period of the analysis and for the periods before and after the 1992 redistricting.

Table 2-3 Summary statistics: voting index

	Observations	Mean	Std. Dev.	Minimum	Maximum
1987 – 1998	276	0.6881	0.1646	0.3762	0.9444
1987 – 1992	276	0.7226	0.1792	0.1944	1.0000
1993 – 1998	276	0.6655	0.1700	0.3333	1.0000

I performed a simple F test to determine if the difference in the means of the before and after redistricting periods is statistically significant. The F value for this test is

81.42, indicating that I can reject the null hypothesis that the means are equal at a confidence level of 0.9999.

An alternate index was also constructed that included a larger set of votes. While all the votes contained an elderly component, the additional votes included in the larger set were less focused on elderly issues. The results in the regressions performed on the alternate index were similar to those in the main regressions, but were weaker. This is to be expected, as the effects of demographic change on elderly issues would be difficult to separate from the other issues included in the bills.

Moreover, a regression was performed using the individual vote as the unit of observation rather than the index. If each individual vote is a separate observation, the much larger sample (11,797 rather than 552) means that each variable will tend to have more statistical significance. However, there is no change in the crucial variables from vote to vote during the period before reapportionment or the period after. The results of this regression are similar to those in the primary regression, but the explanatory power of the model is much lower, with an adjusted R-squared statistic of 0.4110.

Model

For my analysis of the effects of demographic change on the voting index, I performed a panel regression with individual and time fixed effects. The individual effects allow me to isolate the change in the voting index of legislators, rather than capturing ideological characteristics to certain individuals that would cause them to vote in a given way, regardless of the makeup of their districts. The dependent variable is the voting index; I examine how it changes in response to the exogenous shock of redistricting, which changes the districts' demographic characteristics. The explanatory

variables consist of legislator fixed effects and a vector of individual- and time-varying characteristics, including

age (fraction 55 and older)
income (average per capita income)
an interaction term of fraction 55 and older and income
proportion of children (fraction younger than 18)
gender (fraction women)
and educational attainment (fraction with college degree).

Because the index is based on a different number of votes for each period and because there are two observations for each Representative, the standard errors are corrected for heteroskedasticity and clustering of errors within Congressional districts. The sample is made up of 276 legislators for two periods, before and after redistricting.

Hypotheses

Older people should prefer spending to benefit the elderly if they are narrowly self-interested. Thus, a district containing a large proportion of older people should be reflected by a Representative with a higher index value.

Higher income areas will prefer less redistribution because the rich want to keep their money, and there are fewer poor people who would prefer these programs for their own narrow self-interest. Therefore, wealthy areas may oppose programs that redistribute toward the elderly poor. Some programs might be viewed as being more redistributional in nature than others. For example, legislation against age discrimination in employment does redistribute money away from younger workers and toward older people; however, this redistribution works through the labor market, so it is more indirect than transfer payments. This might mean that it is viewed as less redistributional than transfer payments.[4] Programs for the elderly that are not viewed as redistributional might

[4] Redistribution is likely not to the poorest if it works through the labor market. This, combined with the Social Security tax cap, may mean that bills designed to curb age discrimination actually redistribute to the rich.

be normal goods. In addition, as income increases, the opportunity costs of private (i.e. family) provision of services to the elderly increase, raising the demand for public provision of elderly services.

If income has a negative effect on support for elderly programs, this might be mitigated by the proportion of elderly. If income has a positive effect, this should be strengthened by a high number of elderly. Therefore, I include in my analysis an interaction between proportion elderly and income.

Educational attainment is a measure of permanent income. This would imply that, as educational attainment in a district increases, voting for elderly services --- particularly those seen as strictly redistributional --- would fall. On the other hand, the sign may be ambiguous due to the possible normality of services for the elderly, as discussed above.

Intergenerational conflict implies that a high proportion of children in the district should cause less support for elderly issues. A higher proportion of women should increase support for elderly programs. Kenny and Lott (1999) found that suffrage increased government spending at the state level and led to more liberal voting patterns by Representatives. They suggest this is due to the lower incomes of women. Another reason women might prefer more liberal government spending is that traditionally they are society's caregivers, both for children and the elderly. Government programs can be seen as substitutes for women's efforts in caregiving. Finally, women may prefer higher government support for the elderly simply because they live longer than men.

Results

The effects of changes in the demographic makeup of the districts are shown in the following table.

Table 2-4 Changes in elderly voting index

Variable	Coefficient	Effect of a 1 standard deviation increase in X
Fraction aged 55 and up	2.4775	0.0310
	(1.3463)	
Per capita income (coefficient and SE * 1000)	0.0289	-0.0398
	(0.0162)	
Interaction of income and 55 up (coefficient and SE * 1000)	-0.1287	
	(0.0531)	
Fraction aged < 18	0.2901	0.0091
	(2.0047)	
Fraction female	-0.7769	-0.0088
	(2.6387)	
Fraction college grads	1.1692	0.0608
	(0.8016)	
Adjusted R-squared	0.7752	

Standard errors in parentheses. The full effects of the fraction 55 and older and income are found using the means of the interacted variables.

The coefficients for the fraction of the population aged 55 and older and per capita income are statistically significant at the 90% level, while the interaction of these two variables is significant at the 95% level. The variables for the fraction of women, children and college graduates have no statistically significant effect.

The full estimated effect of a 1 standard deviation increase in the proportion aged 55 and older, evaluated at the means, is to increase the voting index value by 0.03. This positive effect is expected, if legislators respond to the perceived wishes of their electorates; that is, if politicians respond to increases in the proportion of older people in their constituencies by voting more often for benefits to the elderly. The effect of an

increase in the fraction aged 55 and older diminishes as income increases, becoming negative when per capita income exceeds $19,250. This is substantially above the mean per capita income of $14,250. If a high per capita income and high proportion of seniors means that the seniors in that district are wealthy, as seems likely,[5] these individuals may be less likely to prefer government services for seniors.

Using the mean value of the proportion of seniors (which is 30%), a 1 standard deviation increase in per capita income is associated with a 0.04 decrease in the index value. This negative value is consistent with the idea that higher income areas prefer less redistribution toward the elderly poor. The effect of an increase in per capita income decreases as a larger fraction of the population is aged 55 and older, and becomes negative when more than 22.5% of the population is in this age group. This is the case in only 30 of the 552 observations.

The proportion of children in the district has no statistically significant effect. This may suggest that intergenerational conflict is not an issue in this context. The proportion of women in the district also has no statistically significant effect, offering no support for the hypothesis that women prefer higher spending on social programs for seniors. The fraction of college graduates in the district also has no statistical significance, suggesting that per capita income captures most of the effects of permanent income.

Pairs of Bills

It is possible that the dependent variable, the elderly voting index, does not clearly measure preferences toward generation-specific redistribution. This could be because politicians vote for other reasons, such as political favor-trading or logrolling, or because

[5] The correlation coefficient for percent 55 and older and per capita income is –0.1308. If seniors tend to have lower incomes on average than people more apt to be in the working population, a high proportion of seniors and a high mean per capita income in a district may imply that the seniors are wealthier than average in this district.

some of the votes in the index bundle elderly services with unrelated issues. In order to address this concern, I undertook a second analysis. I searched for pairs of bills that are very close in content and specific to aging issues, one before and one after redistricting.[6] I attempted to keep the votes as chronologically close together as possible to control for unobserved time-specific variables. However, there was difficulty in finding pairs of bills relating to a specific topic, so in some cases the bills are close to the chronological edges of the dataset.

I then applied probit regression to estimate the relationship between voting on a bill after reapportionment and demographic changes, controlling for voting on an earlier bill. The dependent variable is the vote after redistricting. As in the index, these votes were assigned a value of 1 if pro-elderly and 0 if anti-elderly. The explanatory variables other than the previous vote are similar to those used in the index regressions, except that changes in these variables are used rather than levels. These variables include the changes in per capita income, fractions aged 55 and over and less than 18, and the age-income interaction, with changes in the fraction female and fraction with a college degree included as controls.

The first pair of bills examined is Vote 171 from 1987, "Housing and Community Development/Elderly Rents", and Vote 156 from 1996, "Housing Overhaul/Family Rent Caps." Both of these bills concern limits on rent or rent increases to elderly tenants of subsidized housing, which are antipoverty measures.

I expect the probability that a Representative will vote for this antipoverty bill for the elderly to increase if a larger fraction of his constituency is aged 55 and older. However, this effect should diminish as the district becomes wealthier. If a high per

[6] In their 1998 article on direct foreign investment, Bruce Blonigen and David Figlio examine pairs of related bills to analyze legislators' voting behavior on issues of direct foreign investment.

capita income and high proportion of seniors means that the seniors in that district are wealthy, these individuals will prefer less redistribution to the elderly poor. This implies the interaction coefficient should be negative.

Antipoverty measures should be seen as strongly redistributional in nature. This should allow me to unravel the ambiguous prior on the sign of the income coefficient: I expect the income coefficient to be negative, as the wealthy prefer less redistribution. The hypotheses for the coefficients on the other variables are the same as in the first regression. That is, I expect the effect of an increase in the proportion of children or the proportion of college graduates to be negative, while an increase in the proportion of women should have a positive effect.

While an attempt was made to use pairs of bills that are chronologically close together, there were no other votes in the time frame of this analysis on the specific issue of redistribution toward the elderly. This necessitated using a pair of bills nine years apart. Table 2-5 shows the summary statistics for the constituent demographics of the 164 Representatives who voted on this pair of bills.

Table 2-5 Summary statistics: fraction changes in constituent demographic characteristics for representatives voting on antipoverty measures for elderly

Variable	Mean	Standard Deviation	Minimum	Maximum
Aged 55 and older	0.0022	0.0798	-0.2640	0.3540
Per capita income	0.0313	0.1711	-0.5715	0.9284
Aged less than 18	-0.0039	0.0659	-0.3765	0.2869
College degree	0.0337	0.2071	-0.6843	0.9186
Female	-0.0012	0.0108	-0.0668	0.0338

The second pair of votes concerns age discrimination. Vote 371 from 1986, "Age Discrimination in Employment," addressed whether employers should be exempted from age discrimination laws in hiring and terminating firefighters and police officers. Vote 291 from 1996, "Fiscal 1997 Transportation Appropriations/Commercial Pilot

Retirement," was to determine the appropriate age for mandatory pilot retirement. Note that the first vote is from the year before the beginning of the index. There were no votes related to age discrimination from 1987 to 1992, which made it necessary to use this earlier vote.

In this pair, I separated the effects of aging by using age variables of 65 and older and 55 to 64. This is because most people in the latter age group are still in the labor force, and are thus more likely to be impacted by age discrimination in employment. By the age of 65, however, most people are retired, and should care less about discrimination in employment. Therefore, I expect the effect of an increase in those aged 55 to 64 to be positive, but do not expect a significant and positive coefficient for those aged 65 and older.

I have no strong prior expectations for the other coefficients, as their effects on labor discrimination are unclear. The coefficient for the fraction of women may be negative due to the lower labor force participation rates of women. Table 2-6 shows the summary statistics for the constituent demographics of the 133 Representatives who voted on this pair of bills.

Table 2-6 Summary statistics: fraction changes in constituent demographic characteristics for representatives voting on age discrimination issues

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Aged 55 to 64	133	0.0160	0.1715	-0.3245	0.9737
Aged 65 and older	133	0.0189	0.1967	-0.5903	0.9960
Aged less than 18	133	-0.0103	0.1774	-0.4381	0.9694
College degree	133	0.0509	0.2586	-0.7001	1.0188
Female	133	-0.0150	0.1638	-0.3658	0.9258
Per capita income	133	0.0394	0.0760	-0.5715	0.9284

Table 2-7 shows the results of the probit regressions for the pairs of bills relating to aging issues.

Table 7 Factors influencing congressional votes on elderly issues (probit regressions)

	Antipoverty	Antidiscrimination
CQ Almanac bill number and year	156, 1996	291, 1996
Pre-redistricting vote (Poverty: Bill #171, 1987) (Discrimination: Bill #371, 1986)	1.8571 (0.2715) 0.6380	-0.1669 (0.3017) -0.0582
Change in 55 and over	3.3730 (2.6352) 0.1130	
Change in 55 to 64		3.1566 (3.5927) 0.1315
Change in 65 and older		-2.4558 (2.3521) -0.1132
Change in per capita income	-3.9144 (1.1913) -0.1130	2.4361 (1.1244) 0.1499
Interaction of income and 55 and older	6.0760 (5.7405)	
Interaction of income and 55 to 64		-25.4219 (13.3691)
Interaction of income and 65 and older		21.2754 (9.5832)
Change in younger than 18	0.9701 (2.9549) 0.0254	1.8442 (3.7198) 0.1165
Change in women	9.9898 (12.8983) 0.0431	-4.9843 (6.5793) -0.2906
Change in those with college degree	1.2499 (1.0093) 0.1030	0.2385 (1.0264) 0.0220
Pseudo R-squared	0.3734	0.1442

Standard errors in parentheses. The bottom number is the effect of a 1 standard deviation increase in the explanatory variable. These numbers are computed using the mean values for changes in income and age variables. For the pre-redistricting vote, the bottom number is the effect of moving from a vote of 0 to a vote of 1.

When the antipoverty bills are isolated, the estimated effect of increasing per capita income is negative and significant, as expected. The full effect, including the interaction with age, is quite large. Calculated at the mean value for the proportion of 55

and up, a 1 standard deviation increase in per capita income in the district is associated with a 0.27 decrease in the probability that the Representative will make a pro-elderly vote on the bill.

The estimated effect of an increase in the fraction 55 and older is positive, as expected, but only significant at the 80% confidence level. The coefficient for the interaction term is also positive, which is not expected, but it is not statistically significant. The full effect of the fraction aged 55 and higher, including the interaction with income, is not as large as the income effect, but is still substantial. Calculated at the mean value for per capita income, a 1 standard deviation increase in the proportion of seniors is associated with a 0.11 increase in the probability that the Representative will vote pro-elderly on the bill..

The Representative's action on the pre-redistricting vote is positive and highly significant, as expected. Increases in the fractions of children, women and those with a college degree have little effect.

In the age discrimination pair, the coefficient for the pre-redistricting bill is not statistically significant and has an unexpected negative sign. This, combined with the low pseudo R-squared statistic for this regression, suggests that this may not be a well matched pair of bills. This could be due to the fact that the votes took place 10 years apart. In addition, age considerations for police officers, firefighters and airline pilots may be considered safety issues by some, which makes the age discrimination effects difficult to separate.

The only statistically significant coefficients in this regression are those for the change in per capita income and the interaction term. While the primary coefficients for seniors are not statistically significant, the positive sign of the coefficient for the younger

cohort is as expected. The full effect of a 1 standard deviation increase in the fraction of the district's population aged 55 to 64, evaluated at the means, is to increase the probability the Representative will vote to limit age discrimination in this bill by 0.13. This sign is expected because people in this age group are likely to still be in the work force, and thus be affected by issues of age discrimination. The full effect of a 1 standard deviation increase in the fraction aged 65 and older is to reduce the probability by 0.11. This suggests that older people not impacted by employment issues --- namely, those above the typical working age --- are less concerned with these issues.

The full effect of a 1 standard deviation increase in per capita income, evaluated at the means, is to increase in the probability the Representative will vote to limit age discrimination in this bill by 0.15. As noted above, none of the other variables have a significant effect. It is interesting to note that there is no significant effect due to an increase in the proportion of children in either of the regressions above. This suggests that intergenerational conflict does not occur in this direction, i.e. a high proportion of children does not negatively impact votes on elderly issues.

Children's Issues

In order to test whether intergenerational conflict does occur in the opposite direction, that is, whether a high proportion of aging persons negatively impacts votes on children's issues, I considered 2 pairs of bills on children's issues. The first of these pairs is Vote 372 from 1992, "Child Welfare and Nutrition Programs/Passage" and Vote 543 from 1995, "Fiscal 1996 Agriculture Appropriations/WIC Food Program." These votes deal with antipoverty measures for children, specifically with nutrition programs for children.

If intergenerational conflict is a factor in the support of antipoverty programs for children, the coefficient for 55 and older should be negative. As in the regression on antipoverty programs for the elderly, I expect the sign on the income coefficient to be negative. The coefficient for fraction children should be positive, as districts with a high proportion of children should prefer more children's services. The coefficient on fraction women should also be positive, since women tend to be the primary caregivers for children, and government provision of services is a substitute for private provision. If education is related to permanent income, the education coefficient should be negative. Table 2-8 shows the summary statistics for the constituent demographics of the 214 Representatives voting on this pair of bills.

Table 2-8 Summary statistics: fraction changes in constituent demographic characteristics for representatives voting on antipoverty measures for children

Variable	Observations	Mean	Std. dev.	Minimum	Maximum
Aged 55 and older	214	0.0009	0.0724	-0.2640	0.3540
Aged less than 18	214	-0.0028	0.0611	-0.3765	0.2869
College degree	214	0.0278	0.1875	-0.6843	0.9186
Female	214	-0.0010	0.0102	-0.0668	0.0338
Per capita income	214	0.0298	0.1554	-0.5715	0.9284

The second pair of votes on children's issues is Vote 385 from 1992, "Neighborhood Schools Improvement Act," and Vote 496 from 1993, "School Improvement/Passage." Again, if intergenerational conflict is an issue, the 55 and older coefficient should be negative. The fraction children coefficient should be positive. The income variable should also be positive here, as education is generally thought to be a normal good. This idea is discussed more fully in Chapter 3. This positive effect should particularly be the case since the votes concern national education policy; therefore, Tiebout endogeneity is not likely to be an issue. The coefficient for fraction women may be positive for the same reason as in the previous regression; that is, women

traditionally are the primary caregivers for children. They should be expected to prefer more education as a substitute for their care, and their close relationship with children suggests that altruism may be a factor. Fraction with college degree should be positive, as higher educational attainment is direct evidence of preference for education. Table 2-9 sbows the summary statistics for the constituent demographics of the 263 Representatives voting on this pair of bills, while Table 2-10 shows the results of the probit regressions for the pairs of bills relating to children's issues.

Table 2-9 Summary statistics: fraction changes in constituent demographic characteristics for representatives voting on education improvements

Variable	Observations	Mean	Std. dev.	Minimum	Maximum
Aged 55 and older	263	0.0052	0.0706	-0.2640	0.3540
Aged less than 18	263	-0.0060	0.0577	-0.3765	0.2379
College degree	263	0.0277	0.1914	-0.6843	1.0023
Female	263	-0.0002	0.0101	-0.0668	0.0427
Per capita income	263	0.0312	0.1435	-0.5715	0.9284

In the first regression, the only significant coefficient is the one for the pre-redistricting vote. As expected, the earlier vote's coefficient is positive, and very large. The estimated effect of moving from an anti-child to a pro-child position on the earlier bill is associated with a 0.65 increase in the probability of voting for antipoverty measures for children on the later bill. The coefficient for the fraction change in income is significant at only the 85% confidence level. The negative sign is consistent with the result found earlier: there is a negative relation between income and votes on antipoverty measures. However, note how much smaller is the effect of a one standard deviation increase in per capita income (-0.07) here than in the regressions concerning elderly antipoverty issues (-0.2654).

In the education regression, the previous vote is again the only variable to have a statistically significant effect. The estimated effect of the previous vote is again positive

Table 2-10 Factors influencing congressional votes on children's issues (probit regressions)

	Antipoverty	Education
CQ Almanac vote number and year	543, 1995	496, 1993
Pre-redistricting vote (Antipoverty: Bill #372, 1992) (Education: Bill #385, 1992)	2.1539 (0.2550) 0.6106	3.3201 (0.4015) 0.7585
% change in 55 and older	-0.7968 (10.4750) 0.0000	-10.3924 (13.8709) -0.0183
% change in per capita income	-1.4852 (1.1316) -0.0629	0.0101 (1.4030) 0.0012
Interaction of income and 55 and older	24.2130 (27.9514)	47.6047 (69.2474)
% change in younger than 18	-2.9415 (15.5450) -0.0115	11.3532 (21.9858) 0.0189
% change in women	-9.7333 (31.5709) -0.0139	42.5152 (32.2058) 0.0253
% change in those with college degree	-2.5580 (7.4047) -0.0187	13.2747 (11.5623) 0.0434
Pseudo R-squared	0.4389	0.6592

Standard errors in parentheses. The bottom number is the effect of a 1 standard deviation increase in the explanatory variable. These numbers are computed using the mean values for changes in income and age variables. For the pre-redistricting vote, the bottom number is the effect of moving from a vote of 0 to a vote of 1.

and significant, with a very large estimated effect (0.78) of moving from an anti-child to a pro-child stance on the earlier vote.

In both of these pairs, the pre-redistricting vote is responsible for nearly all the explanatory power of the model. The pseudo R-squared statistic for the antipoverty pair is 0.4764, but is 0.4538 when only the pre-redistricting vote is used as an explanatory variable. Similarly, the pseudo R-squared for the education pair is 0.6373, but is 0.6266 when only the pre-redistricting vote is used as an explanatory variable. This suggests that

demographic change has little effect on how Representatives vote on issues pertaining to the well-being of children.

In the education regression, the effect of the previous vote is again positive and significant, with a very large estimated effect (0.7585) of moving from an anti-elderly to a pro-elderly stance on the earlier vote. The income coefficient is not significant, and is very small in any case. The coefficient for the fraction of women is positive and significant, as expected. However, a 1 standard deviation increase in the proportion of women is associated with only a 2.5% increase in the dependent variable. None of the other variables are significant.

Conclusion

An important question in the political economy literature is whether politicians vote in a way that reflects the presumed preferences of their electorates, or simply vote according to their own preferences. Using demographic data from the 1990 Census and vote records of individual members of the House of Representatives from 1986 to 1998, and redistricting as a natural experiment, this chapter offers evidence that politicians are indeed Representatives when voting on issues related to the elderly.

It should be noted that this analysis does not take several factors into account. More work should be undertaken to determine the effects of differential voting participation rates of competing cohorts, as well as the effects of interest group power (e.g. fraction membership in AARP). Also, if the newness of a Representative to his constituency matters, the chronological distance from the point of redistricting should play a role in voting behavior. Another key question is the extent to which politicians whose voting records do not reflect the demographic makeup of their electorates are punished by defeat in election. Finally, it would be interesting to see if politicians vote

strategically to ensure reelection, voting more in line with the characteristics of their constituencies close to elections.

This chapter offers a unique and effective identification strategy which can be used in addressing the additional questions raised here. This area of inquiry will contribute to a better understanding of voting behavior in a representative democracy as well as issues of intergenerational conflict.

CHAPTER 3
IT TAKES A VILLAGE? INTERGENERATIONAL CONFLICT AND COOPERATION IN EDUCATION EXPENDITURES

Introduction

A major theme in tbe public economics literature involves the determinants of spending on public education. Researchers including Poterba (1997, 1998), Ladd and Murray (2001), and Harris, Evans and Scbwab (2001) have examined the effects of intergenerational conflict, and have found that the elderly have either a negative effect or no effect on education spending. A consistent finding in these analyses is that differences in the races of tbe elderly and the younger cohort are associated witb significantly lower education spending. This paper provides evidence as to why support of education by the elderly varies. My results offer a new way of thinking about altruism, and belp to explain tbe disturbing results others have found tbat migbt suggest racism among the elderly. If tbe elderly develop connections to their communities, tbe migration patterns of the elderly in an area should affect education spending in the area. My model includes unique instruments to explicitly explain the migration bebavior of the elderly.

In a state-level analysis, Poterba (1997) finds that education spending falls as the state's fraction of elderly rises. This negative result is not robust to tbe addition of an urbanicity measure, however. Poterba also finds a strong negative effect of differences in the racial composition of the scbool-aged and elderly cohorts, which benceforth will be called cross-cobort racial heterogeneity.

The relevant Tiebout market for education is generally accepted to be the county or metropolitan statistical area (MSA). Ladd and Murray (1999) point out that a county- or district-level analysis can capture many important features of education finance that would be missed at the state level. They conduct an analysis similar to Poterba's, but at the county level with county and time fixed effects. They find that the proportion of elderly has no significant effect on per child education spending in any specification. However, they too find cross-cohort racial heterogeneity to have a negative effect. Ladd and Murray also perform a state-level analysis that includes measures for how retirees and children are distributed within states and how segregated the cohorts are. Their results indicate that segregation from the school-aged cohort makes the elderly less willing to support education.

The consistent negative effect of the "racial mismatch" leads to an interesting question. Are the elderly simply racist? I propose a different explanation. The negative effects of cross-cohort racial heterogeneity, combined with Ladd and Murray's segregation result, suggest that some sense of connectedness might matter to the elderly when they make decisions about funding for education.

The elderly do not enjoy the direct benefits of public education, unlike families with children. Other researchers including Poterba (1998) and Kemnitz (2000) have discussed the external benefits of education that might make the elderly more willing to improve it. These include decreased crime, a higher level of services such as health care, and increased Social Security contributions from the better educated younger cohort. In the real world, though, the elderly will not live to enjoy these external benefits of paying to improve education now. For example, improving a child's education now may make

him less likely to commit crimes now, but the effect presumably (and hopefully) extends to the child's full lifetime. If this is the case, the elderly will not live long enough to benefit from the cumulative reduction in crime. The immediate gains to the welfare of the elderly will be small; thus, the elderly should be unwilling to fund education.

Altruism would mitigate this tendency. Following Becker's (1981) work on the economics of the family, grandparents are very likely to support those children who mean the most to them: their grandchildren. If grandparents living in the same locale as their grandparents shift the position of the median voter, this will lead to higher spending on education. Once we are outside the confines of the family, however, the literature does not explain why we might be more altruistic toward some people than others.

I propose that the extent to which we are altruistic depends on how connected we are to the beneficiaries of our good will. Charity begins at home, and then extends to others. That is, if the elderly subscribe to the idea that "it takes a village to raise a child," they will also act to help other children who are part of their village --- close to them in a geographic sense or with whom they identify in some other way.

It may also take time for people to identify with their communities; if this is the case, they will become more altruistic with longer residence. If recent residents of a community maintain some sense of connection to their previous residence, support for education among the elderly should be highest where more of the elderly are long-time residents (i.e. moved a distance of zero); and lowest where more of the elderly have moved in from far away.

The next section of the paper discusses the data and the empirical strategy, which is to estimate of the effects of elderly migration on school spending with ordinary least

squares (OLS). The following section presents the results of the ordinary least squares regressions. However, this approach does not take into account the possible endogeneity of migration with respect to education spending. This is followed, then, by a section including a discussion of this Tiebout endogeneity and how this issue is addressed. I use several creative instruments, including the number of golf courses per square mile in each county, to directly explore the migration patterns of the elderly. The following section presents the results of the first-stage regressions, which predict elderly migration from out of state, as well as the results of two-stage and three-stage least squares regressions to explain school spending. Finally, some concluding remarks are presented.

Empirical Strategy and Data Collection

In this paper I explore the effect of elderly migration on education expenditures. Migration statistics from the United States Census of Population are available only at the county and state levels, precluding a district-level analysis employing these data. This information comes from respondents' answers to questions about where they lived five years earlier. Migration data that describe previous residence are available at the county level for 1990 only[7], so a panel analysis is also impossible. I therefore perform a county-level cross section analysis for 1990, using demographic and migration data from the 1990 Decennial Census of Population and Housing and school finance data from the 1992 Census of Governments.

[7] County-to-county migration data are also available from the 1980 Census, but do not include information on migrants' previous residences.

My first approach is to estimate an ordinary least-squares model with state dummy variables. The dependent variable in my county-level model is the natural logarithm of per pupil state plus local revenues to education in county i in state j.[8] The basic model is:

$$\ln(\text{per pupil revenues}_{ij}) = X_{ij}\beta + Z_{ij}\gamma + S_j\delta + \varepsilon_{ij}$$

All variables are in natural logarithms to yield elasticities. The explanatory variables of primary interest are those in Z_{ij}, which is a vector of migration data consisting of the fraction of each county's population that is both aged 65 and higher and that lived in the same county in 1990 as in 1985; the fraction that migrated to the county from within the same state; and the fraction that migrated from a different state.

If the elderly are self-interested and the external benefits they receive from education are relatively small, a higher proportion of elderly in a county should be associated with lower education spending. However, the migration patterns of retirees may mitigate this tendency. Community-based altruism implies that elderly nonmovers should not have a large negative effect on education spending. A larger proportion of retirees moving within the state may have a positive or negative impact on education; if positive, the effect should be smaller than that of the elderly nonmovers. If negative, it should be smaller in magnitude than the negative effect of a higher proportion of elderly inmigrants from out of state.

X is a vector of demographic control variables. These include the number of school districts per hundred thousand population, fraction of the population that is

[8] Poterba (1997, 1998) and Ladd and Murray (2001) use per child measures to help prevent any endogeneity issues with the number of public school pupils. However, Harris, Evans and Schwab (2001) use per pupil measures. The education revenues or expenditures and number of school-aged children are from two different data sources. I follow HES and construct the education finance variables from a single data source to avoid measurement error.

nonwhite, a term for cross-cohort racial heterogeneity, median household income, fraction of those aged 25 and older with at least some college, a tax price variable, fraction of homes owner occupied and fraction of the population in an urban area. The number of school districts is from the 1992 Census of Governments; the remaining variables in X are from the 1990 Census of Population and Housing.

Community-based altruism should be higher where the communities are smaller. This would suggest that a larger number of districts per hundred thousand persons should be reflected by higher education spending, ceteris paribus. However, there should also be an offsetting competition effect, which will drive costs, and therefore expenditures, down as the number of districts increases.

A large literature suggests that the quality of education received by nonwhites is less than that of whites; this is presumably due to the historically inferior educational opportunities afforded to nonwhites. Lower educational quality among adults is likely to be associated with lower demand for education for children. This would imply lower per pupil expenditures where a higher proportion of the population is nonwhite. Racial differences between the elderly and children may also cause lower education spending because the elderly may feel more altruism toward children who are more like them. This cross-cohort racial heterogeneity is measured by the absolute value of the difference between the nonwhite share of the population aged 5 to 17 and the nonwhite share of the population aged 65 and higher.[9,10]

[9] 0.0000001was added to the fractional values in each county to prevent undefined values in the natural logarithm, and the resultant decrease in sample size.

[10] The linear distance between the nonwhite fractions of each cohort measures cross-cohort racial heterogeneity. Previous researchers use a simple difference, but the linear distance is the absolute value. 97 of the 2520 counties in my sample have a cross-cohort racial heterogeneity value less than zero. In

Education is generally accepted to be a normal good; higher median household income should be associated with higher spending on education. Educational attainment is a commonly used proxy for permanent income, but higher educational attainment is also direct evidence of a taste for education. In either case, a larger fraction of the population aged 25 and older with at least some college should be associated with higher education spending.

Increasing the price of education, however, should lead to less demand for it. The tax price variable is equal to median household income divided by mean household income, multiplied by the mean number of children per household. If taxes for education are proportional to income, this is the median voter's cost of increasing per child education spending by one dollar.[11] As median income increases relative to mean income --- that is, as the income distribution becomes less skewed --- the median voter's education subsidy from wealthier families shrinks.

Several authors, including Black, Figlio, and Harris, Evans and Schwab have shown or suggested that increases in education spending are capitalized into housing prices. A higher fraction of homeowners in a county should thus increase per pupil spending. However, some researchers also have found homeownership to have a negative effect on school spending. This has been explained as a renters' illusion effect, where renters do not believe property tax increases are borne by them. Hence, they will prefer higher school spending than otherwise identical homeowners.[12]

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these counties, there is a higher fraction of nonwhite elderly than nonwhite children. None of the results shown later change appreciably when the alternate measure is used.

[11] See Lovell (1978) for a thoughtful discussion of this tax price variable and empirical evidence of its validity.

[12] Denzau and Grier (1984).

An increase in the fraction of a county's population living in an urban area is expected to have a negative effect on per pupil spending because of economies of scale and other cost differences between urban and rural areas, such as the higher cost of transporting pupils for longer distances in rural areas. This will be offset to some extent by the higher wages paid in urban areas.

The education finance data from the 1992 Census of Governments include revenue to education from local, state and federal sources and the number of pupils enrolled in the fall semester, to yield the dependent variable and federal aid per pupil. These data are aggregated from the school district level to the county level. Of the 15,868 districts listed in the Census of Governments, 98 were dropped because they could not be matched to a county. These include special districts for regional technical schools and other schools that appear to draw students from more than 1 county. Eight hundred and seventeen districts were dropped because their total revenue or enrollment was recorded as zero; 19 additional observations were dropped because of missing or obviously incorrect data. Many of these districts truly have no students; after district consolidation, it often takes as long as 10 years for a district to be dissolved. Districts in the independent cities of Virginia were not included in my county-level analysis, and some of the demographic data are not available for Hawaii or Alaska counties or the District of Columbia.

Some states mandate equalization of educational resources across districts within the state. In these states, there is little or no choice in education spending at the local level, so that expenditures on public education will not be affected by differences in demand due to differences in the characteristics of the residents. The twelve states with

the lowest variation in per pupil spending, as measured by the coefficient of variation of per pupil revenues, are thus omitted from the sample.[13] The final aggregated sample consists of 2,520 counties from the remaining 36 continental states.

S_j is the vector of state dummies. These serve as controls for characteristics, such as state law and the structure of public education, that affect the state's education spending. State contributions make up a large fraction of a school district's revenues for education. Finally, the error term ε_{ij} is assumed to have zero mean and constant variance.

Differences in costs between rural and urban areas (e.g. teacher wages, transportation costs and economies of scale) also affect expenditures; therefore, I separately consider the urban portion of the sample. This subsample consists of the 1,850 counties from the full sample for which less than 100% of the population lived in a rural area. Table 3-1 shows the key summary statistics for the 2 county-level samples.

Table 3-1 Sample summary statistics

Full sample Variable	Mean	Std. dev.	Min.	Max.
Per pupil state plus local revenue	4,592	1,526	1,032	23,250
Fraction of the county's population that is aged 65 and older and that did not move between 1985 and 1990 [1]	0.1185	0.0364	0.0108	0.2810
Fraction of the county's population that is aged 65 and older and that moved from within the state but not the county	0.0254	0.0107	0.0000	0.1363
Fraction of the county's population that is aged 65 and older and that moved from out of state	0.0055	0.0063	0.0000	0.0931
School districts per hundred thousand population	29.20	63.35	0.05	1,298.70
Fraction nonwhite	0.1356	0.1563	0.0000	0.9490

[13] Twelve states (Arizona, Arkansas, Connecticut, Delaware, Indiana, Iowa, Kentucky, Maine, New Hampshire, New Jersey, Rhode Island, and Wisconsin) have coefficients of variation less than 0.1. These twelve include four (Arkansas, Connecticut, Kentucky and New Jersey) of the ten states that had state Supreme Court decisions overturning the education finance systems and mandating equity and/or adequacy in educational resources by 1990. See Figlio, Husted, and Kenny (2001) for more discussion of these decisions.

Nonwhite share aged 5 to 17 less nonwhite share aged 65 and older	0.0762	0.0801	-0.1096	0.4596
Median household income	23,636	6,185	9,791	54,801
Tax price	2.1413	0.2546	0.8005	5.6337
Fraction of the county's population aged 25 and older with at least some college	0.3572	0.1097	0.1170	0.8120
Per pupil federal revenue	387.49	332.57	0.00	6,775.44
Fraction homeowner	0.6146	0.0915	0.1010	0.8270
Fraction urban	0.3528	0.2950	0.0000	1.0000

Urban subsample				
Per pupil state plus local revenue	4,413	1,247	1,032	20,340
Fraction of the county's population that is aged 65 and older and that did not move between 1985 and 1990 [1]	0.1106	0.0319	0.0108	0.2402
Fraction of the county's population that is aged 65 and older and that moved from within the state but not the county	0.0247	0.0096	0.0016	0.0826
Fraction of the county's population that is aged 65 and older and that moved from out of state	0.0056	0.0069	0.0000	0.0931
School districts per hundred thousand population	15.62	22.16	0.05	475.66
Fraction nonwhite	0.1425	0.1466	0.0006	0.9490
Nonwhite share aged 5 to 17 less nonwhite share aged 65 and older	0.0828	0.0777	-0.1096	0.4374
Median household income	24,712	6,390	9,791	54,801
Tax price	2.1610	0.2444	1.2427	5.2211
Fraction of the county's population aged 25 and older with at least some college	0.3692	0.1113	0.1410	0.8120
Per pupil federal revenue	359.62	284.40	60.26	6,775.44
Fraction homeowner	0.6225	0.0818	0.1910	0.8270
Fraction urban	0.4806	0.2390	0.0006	1.0000

Demographic and migration data are from 1990 and school finance data are from 1992. The full sample is made up of the 2520 counties from the 36 continental states that have a coefficient of variation of per pupil state plus local revenues greater than 0.1. The urban subsample is made up of the 1850 observations in the full sample for which the fraction rural is less than 1.

The characteristics of the full and urban samples are strikingly similar. The dependent variable is per pupil state plus local revenues to education. Mean revenues are \$4,592 in the full sample and \$4,413 in the subsample, with standard deviations of \$1,526

and \$1,247. The range of revenues is large, from approximately \$1,000 to over \$20,000, but per pupil spending increases smoothly over the entire range. Twenty-three counties in the full sample and 9 in the urban sample have per pupil spending greater than twice the mean value.

The explanatory variables of main interest are those for elderly migration. Those aged 65 and higher make up 14 to 15% of the county's population, on average. This elderly group is broken down by migration characteristics. On average, the elderly who lived in the same county in 1985 and 1990 make up 11 to 12% of the county's population. Approximately 2.5% of the population consists of the elderly who migrated within a state, and an additional .06% are elderly from out of state.

Results

The results of the ordinary least squares regressions with robust standard errors are presented in Table 3-2. State dummy variables are included in all specifications, and all variables in these regressions are in natural logarithms to yield elasticities. The second column for each specification shows the result (in dollars of per pupil revenue) of a 1 standard deviation change in each explanatory variable. The relative magnitudes of the elasticities and the dollar effects may differ because of the variation in the standard deviations of the explanatory variables. The first page contains the results of the regressions performed on the full sample; the second page contains the results for the urban sample.

The variables of primary interest are those related to age and migration. The large, positive estimates for the elderly nonmovers in both samples are surprising. The benchmark group is all households not aged 65 and older, who may or may not have children. The positive estimated elasticity suggests that elderly nonmovers are more

Table 3-2 Determinants of per pupil state and local revenue for education county-level cross-section (1990), ordinary least squares regressions

Full sample	Elasticity	Effect of a 1 SD change in X
Fraction of the county's population that is aged 65 and older and that did not move between 1985 and 1990 [1]	0.1360	205.27
	(0.0280)	
Fraction of the county's population that is aged 65 and older and that moved from within the state but not the county	-0.0170	-49.22
	(0.0082)	
Fraction of the county's population that is aged 65 and older and that moved from out of state	-0.0131	-94.89
	(0.0034)	
School districts per hundred thousand population	0.0685	426.50
	(0.0087)	
Fraction nonwhite	0.0074	
	(0.0057)	
Absolute value of the nonwhite share aged 5 to 17 less the nonwhite share aged 65 and older	-0.0050	
	(0.0060)	
Median household income	0.3416	384.14
	(0.0424)	
Tax price	-0.1292	-64.30
	(0.0692)	
Fraction of the county's population aged 25 and older with at least some college	0.0802	110.13
	(0.0241)	
Per pupil federal revenue	-0.0284	
	(0.0182)	
Fraction homeowner	-0.2655	-205.22
	(0.0348)	
Fraction urban	-0.0043	-126.56
	(0.0006)	
R squared	0.6947	
Urban subsample		
Fraction of the county's population that is aged 65 and older and that did not move between 1985 and 1990 [1]	0.1121	155.21
Fraction of the county's population that is aged 65 and older and that moved from within the state but not the county	-0.0007	
	(0.0143)	

Fraction of the county's population that is aged 65 and older and that moved from out of state	-0.0094	-45.50
	(0.0041)	
School districts per hundred thousand population	0.0592	318.33
	(0.0102)	
Fraction nonwhite	-0.0029	
	(0.0085)	
Absolute value of the nonwhite share aged 5 to 17 less the nonwhite share aged 65 and older	0.0017	
	(0.0058)	
Median household income	0.4272	465.50
	(0.0604)	
Tax price	-0.2061	-94.67
	(0.0749)	
Fraction of the county's population aged 25 and older with at least some college	0.0595	76.72
	(0.0283)	
Per pupil federal revenue	0.0627	
	(0.0362)	
Fraction homeowner	-0.1540	-95.39
	(0.0418)	
Fraction urban	-0.0022	
	(0.0061)	
R squared		

The second column is the effect, in dollars of per pupil revenue, of a 1 standard deviation change in the explanatory variable.
All variables are in natural logarithms. All specifications include state dummies. Individuals are considered nonmovers if they moved within the county. Demographic and migration data are from 1990 and school finance data are from 1992. The full sample is made up of the 2520 counties from the 36 continental states that have a coefficient of variation of per pupil state plus local revenues greater than 0.1. The urban subsample is made up of the 1850 observations in the full sample for which the fraction rural is less than 1.

likely to support education, compared younger households. These younger households include those without children that moved, and these households might be expected to have very low demands for education. A 1 standard deviation increase in the log of the fraction of nonmovers increases revenues by $205 in the full sample and $155 in the

urban subsample. Recall that the mean value of per pupil revenues is approximately $4,500.

The estimated elasticities of the migration coefficients only partially follow the predicted ordering. In the full sample, the estimated elasticity for instate movers is -0.02 and statistically significant, with a 1 standard deviation rise leading to an estimated decrease of $49 in per pupil revenues. The elasticity for movers from another state is predicted to be more negative than this estimate, but the elasticity is -0.01. However, the dollar effect of -$95 is indeed more negative than the estimate for instate movers.

The migration coefficients in the urban subsample do follow the predicted ordering: the estimated elasticity for instate movers is not significantly different from zero, while the elasticity for movers from another state is estimated to be -0.009. The dollar effects of a 1 standard deviation change in these variables also follow this ordering; the instate movers' effect is essentially zero while the effect of the movers from another state is estimated to be -$46. It is likely that these estimates are biased, however, because this model does not control for the endogeneity of location choice with respect to education spending.

It is interesting to note that when the migration patterns of retirees are taken into account, cross-cohort racial heterogeneity has no effect. The estimated elasticity of this racial mismatch term is not significantly different from zero in either sample. One potential explanation for this is that the mismatch term is simply picking up the effects of migration.

Recall that my definition of racial mismatch differs somewhat from that of previous researchers. Poterba and Harris, Evans and Schwab use the simple difference

between the nonwhite fraction of school-aged children and the nonwhite fraction of those aged 65 and older, while I use the absolute value of this difference. The absolute value measures cross-cohort racial heterogeneity, with the hypothesis that the elderly will be less likely to support education if they are of a different race than the local schoolchildren. The simple difference, however, has a different interpretation: an increase in this measure means there are proportionally either more nonwhite children or more white elderly, or both. The negative estimated effect that others have found for this variable implies that the white elderly may be racist. Ninety-seven counties in my sample have a negative mismatch value, where there is a larger fraction of nonwhite elderly than nonwhite children; for these counties, the difference in definition matters. The results of my analysis do not change when the simple difference is used rather than the absolute value. This may be simply because such a small fraction of the sample is affected by the change in definition. However, using the absolute value rather than the simple difference does lead to a slightly better fit, as measured by the adjusted R squared.

The estimated elasticity for the number of school districts per hundred thousand persons in the population is positive and significant in both samples, as predicted. This result is consistent with the idea that support for education is likely to be higher where the community is smaller, because of the higher level of community-based altruism. The estimated elasticities are not large at 0.06 to 0.07, but the dollar effects associated with a 1 standard deviation increase in this variable range from a \$318 to \$426 increase in per pupil revenues.

The other variables in the models are intended as controls, but bear some discussion here. The estimated effect of increased median household income is positive

and significant, as predicted, with estimated elasticities of 0.34 and 0.43. These elasticities are larger than those obtained by Ladd and Murray, but are consistent with the income elasticities more commonly found in the literature.[14] The estimated dollar effects are $384 in the full sample and $466 in the urban subsample.

An increase in the nonwhite proportion of the population has no significant effect in either sample. This suggests that median household income captures all of the effects of educational quality. The estimated elasticity of the tax price variable is negative and significant in both samples, as predicted; as the price of education rises, less education is demanded. The estimated price elasticity is -0.13 for the full sample and -0.21 for the urban sample; the dollar effects of a 1 standard deviation increase in the tax price variable are -$64 and -$95, respectively.

As predicted, an increase in the fraction of the adult population with at least some college education has a positive effect on per pupil revenues. The fact that the estimated elasticities are significant is consistent with the idea that educational attainment is a signal of taste for education, and is not just a proxy for income. It could also be that the education variable is picking up the part of permanent income not captured by current income. The effects are not large, though, with estimated elasticities of 0.06 to 0.08 and estimated dollar effects of $76 to $110.

The estimated effect of an increase in the fraction of homeowners is negative and significant in both samples. This supports the renters' illusion hypothesis, where renters do not believe property tax increases are borne by them. Hence, they will prefer higher

[14] See Denzau and Grier (1984) for consistent estimates of key parameters affecting education spending.

school spending than otherwise identical homeowners.[15] These negative elasticities are fairly large, at -0.15 to -0.27, but the estimated dollar effects are only -\$85 to -\$95.

Finally, an increase in the fraction of the population living in an urban area has a negative effect in the full sample and no significant effect in the urban subsample. The estimated elasticity is small, at only -0.004, with estimated 1 standard deviation effect of -\$127 on per pupil revenues. The small size of the estimates is likely due to the offsetting cost differences between urban and rural areas, although the economy of scale effects and higher rural transportation costs dominate the higher costs of urban salaries in the full sample.

Controlling for the Effects of Tiebout Sorting

Researchers including Hoyt and Rosenthal (1997) offer evidence consistent with Tiebout's idea that households sort efficiently across locations to receive their preferred levels of public goods. The elderly can control their tax liabilities through location choice as well as through voting. Therefore, the proportion of elderly in a county is endogenous with respect to education expenditures. This makes bias likely in the coefficients from the ordinary least squares regressions. Harris, Evans and Schwab and Ladd and Murray attempt to control for this endogeneity using an instrumental variables approach. They instrument for the fraction elderly in a given year with the fraction aged 55 to 64 in the district (or county) 10 years before. Instead of using the fraction elderly in the county as the key explanatory variable, my model employs the migration variables, which sum to the fraction elderly. I use several instruments to directly explore the migration patterns of the elderly.

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[15] See, again, Denzau and Grier.

These instruments are employed in two-stage least squares and three-stage least squares frameworks. The advantage of the three-stage procedure is that the first stage includes only the variables that are dictated by theory. The two-stage process includes all the second-stage variables in the first stage regressions, which is less intuitively appealing. It avoids a serious problem of three-stage least squares, however, where misspecification of either equation in the system will contaminate the coefficients for the entire system.

Graves (1979) showed that areas with high variations in temperature or other manifestations of undesirable climates have lower immigration for groups of all ages, ceteris paribus. This result should be particularly strong for elderly movers, as they do not face labor market constraints. Mean January temperature is included as an instrument to capture the effects of climate. It is a proxy for temperature variation, as there is less variation in summer temperatures than in winter temperatures across regions. In addition, the elderly are particularly susceptible to the dangers of cold winters, such as slipping on ice and shoveling snow. Finally, researchers including Dewey, Husted and Kenny have shown that compensating wage differentials exist that make wages higher in areas with low January temperatures. This implies that cold winters are undesirable. Once people retire and wages no longer affect their choice of residence, they would be expected to move to warmer climates. For all of these reasons, a higher mean January temperature should have a positive effect on elderly inmigration.

Graves considered weather as an example of amenities that affect migration decisions. Other amenities that appeal to the elderly include favorite leisure activities such as golf and going to the beach. Thus, coastal counties and those with more golf

courses should attract more elderly movers. Each county's number of golf courses per square mile and a coastal dummy are included to capture these amenities. An interaction of temperature with the coastal variable is also included.[16] I expect the estimates for these variables to be positive, as beaches are best enjoyed in warm weather.

The standard deviation of land slope is also included, but the expectation for its effect is less clear. While anecdotal evidence suggests that retirees enjoy the scenic beauty of the mountains, the increased difficulty of transportation in rugged terrain may be undesirable to the elderly.

The cost of living has also been shown to be an important predictor of elderly migration[17]; the urbanicity measure is intended to capture the cost of living. Urban areas have higher costs of living due to higher land costs, so more urban areas should attract fewer elderly movers.

Data on the number of golf courses in each county are supplied by the National Golf Foundation, and land slope data are from David Figlio and Joe Stone.[18] The coastal dummy was obtained by inspection of state maps. The fraction of the county's population living in an urban area is from the 1990 Census of population.

The mean January temperature of each county (in degrees Fahrenheit) is derived from the National Oceanic and Atmospheric Administration's National Climactic Data Center files. These files include mean January temperature by weather station. The mean January temperatures for all stations in the county were averaged to derive the

[16] The interaction between golf courses and temperature could not be included because of collinearity; the simple correlation between the natural logarithms of the number of golf courses and the interaction term is 0.90.

[17] See Fournier, Rasmussen and Serow (1988).

[18] Special thanks to David Figlio and Joe Stone for the land slope data.

county mean January temperature. No weather stations are listed for 467 counties; for these counties, the mean January temperatures of the adjacent counties (or closest counties where there are no weather stations in the adjacent counties) were averaged. State maps showing county boundaries were used to determine the surrounding counties for this purpose.

Table 3-3 Summary statistics for the determinants of elderly migration

Full sample	Mean	Std. Dev.	Minimum	Maximum
Fraction of the population that is aged 65 and older and that lived in the same county in 1985 and 1990	0.0055	0.0063	0.0000	0.0931
Mean January temperature	38.21	12.31	1.20	73.23
Number of golf courses per square mile	0.0079	0.0143	0.00	0.1742
Standard deviation of land slope	0.8185	1.0902	0.0097	6.9052
Fraction of the population living in an urban area	0.3528	0.2950	0.0000	1.0000
Urban Subsample				
Fraction of the population that is aged 65 and older and that lived in the same county in 1985 and 1990	0.0056	0.0069	0.0000	0.0931
Mean January temperature	39.54	11.91	1.20	73.23
Number of golf courses per square mile	0.0100	0.0161	0.00	0.1742
Standard deviation of land slope	0.8095	1.0918	0.0097	6.9052
Fraction of the population living in an urban area	0.4806	0.2390	0.0006	1.0000

The full sample is made up of the 2520 counties from the 36 continental states that have a coefficient of variation of per pupil state plus local revenues greater than 0.1. The urban subsample is made up of the 1850 observations in the full sample for which the fraction rural is less than 1.

As mentioned in the discussion of Table 3-1, the mean fraction of elderly from out of state is 0.006 in both samples. There is a great deal of variation in this fraction: the standard deviation is greater than the mean at approximately 0.007, and the elderly from out of state make up more than 9% of the population at the maximum. Mean January temperature is 38 to 40° Fahrenheit, and ranges from 1° to 73° Fahrenheit.

The supply of golf courses is quite varied across counties. The mean number of golf courses per square mile is 0.008 for the full sample and 0.01 for the urban sample,

with a standard deviation of 0.014 to 0.016. The number of golf courses per square mile ranges from zero to 0.1742. There is also a great deal of variation in the land slope variable. The mean of the standard deviation of land slope is approximately 0.81 with a standard deviation of over one, and a range of 0.01 to 6.9.

Results

The hypotheses for the determinants of elderly migration are, for the most part, supported by the results shown in Table 3-4. The dependent variable is the natural logarithm of the fraction of the population that is elderly and that migrated from out of state, and has a mean of -5.68 in the full sample (-5.49 in the subsample) and a standard deviation of 1.34 (0.89 in the subsample). It is in natural logarithm form to be consistent with the variables in the main regressions. The explanatory variables are also in logarithms.

The estimated effect of warmer January weather is positive and significant in all specifications except the three-stage regression performed on the subsample. This effect is even stronger in the coastal counties in the three-stage specifications, but the interaction term has no significant effect in the two-stage regressions. These results suggest that warmer winter weather is an important consideration for retirees deciding to move out of state, and becomes even more important in coastal areas.

A 1 standard deviation increase in the natural logarithm of January temperature is associated with a 0.0006 increase in the fraction of elderly inmigrants from out of state in both two-stage specifications, where the interaction of January temperature with the coastal dummy has no significant effect. The coastal interaction does have a significant effect in the three-stage regressions. If the county does not have a coast, a 1 standard

Table 3-4 Determinants of elderly migration from out-of-state

From county-level cross-section (1990)	2SLS Full sample	2SLS Urban subsample	3SLS Full sample	3SLS Urban subsample
Mean January temperature	0.4043	0.3772	0.2421	0.0993
	(0.1868)	(0.1583)	(0.0866)	(0.0770)
Number of golf courses per square mile	0.0664	0.0617	0.1039	0.1014
	(0.0121)	(0.0149)	(0.0109)	(0.0128)
Coastal dummy	0.1230	-0.1908	-0.7030	-1.2909
	(0.4181)	(0.3027)	(0.3349)	(0.2622)
Interaction of January temperature and the coastal dummy	0.0009	0.0062	0.0247	0.0379
	(0.0091)	(0.0065)	(0.0072)	(0.0056)
Standard deviation of land slope	0.1120	0.0884	0.2236	0.2090
	(0.0444)	(0.0362)	(0.0282)	(0.0226)
Fraction of the population living in an urban area	0.0030	-0.2165	0.0031	-0.1296
	(0.0061)	(0.0491)	(0.0055)	(0.0412)

All variables are in natural logarithms. The two-stage specifications include state dummies, as well as the natural logarithms of the number of school districts per hundred thousand population, nonwhite fraction of the population, absolute value of the nonwhite share aged 5 to 17 less the nonwhite share aged 65 and older, median household income, mean income divided by mean income times the mean number of school-aged children per household, fraction of the population aged 25 and older with at least some college, per pupil federal revenue, fraction homeowner and fraction urban. Demographic and migration data are from 1990 and school finance data are from 1992. The full sample is made up of the 2520 counties from the 36 continental states that have a coefficient of variation of per pupil state plus local revenues greater than 0.1. The urban subsample is made up of the 1850 observations in the full sample for which the fraction rural is less than 1.

deviation increase in the natural logarithm of January temperature is associated with a 0.0003 increase in the fraction of elderly immigrants from out-of-state in the full sample, and has no significant effect in the subsample. If the county does have a coast, the full effect is larger: an increase of 0.0010 in the full sample and 0.0006 in the urban sample.

More golf courses per square mile are also associated with higher elderly migration from out of state in all specifications. A 1 standard deviation increase in the natural logarithm of the county's number of golf courses is associated with an increase in elderly migration from out of state ranging from 0.0005 to 0.0008 in the two-stage regressions, and from 0.0009 to 0.0014 in the three-stage regressions.

The land slope variable has a positive effect on the migration of retirees from out-of-state in all specifications. This effect is largest in the three-stage specifications, where it is estimated to increase migration by 0.0010 in both the full and urban samples. The estimated effect in both two-stage regressions is 0.0005. This suggests that retirees enjoy the beauty of mountainous regions, notwithstanding the difficulties this may cause for transportation.

The full effect of coastal counties on migration is slightly more complex. The coastal dummy has no significant effect in the two-stage specifications. In the three-stage regressions, the coast has a positive effect on elderly migrants from out of state if the mean January temperature is above 28.5° Fahrenheit for the full sample and 13° for the urban sample. Only 520 counties of 2,520 have mean January temperatures below 28.5°. No counties have both a seacoast and a mean January temperature below 28.5°, while 31 counties with a coast on a Great Lake have such cold winters. Of the 1,850 counties in the urban subsample, 66 have mean January temperatures below 13°, but none of these has a coast. These effects suggest that the elderly can better enjoy the coast in warmer weather.

The effect of urbanicity on elderly migration is mixed. The fraction of the county's population living in an urban area has a significant effect on elderly migration from out of state only in the regressions performed on the urban subsample. A higher level of urbanicity has the predicted negative effect in these specifications, with estimated elasticities of -0.13 to -0.22. A 1 standard deviation increase in the fraction of the population in an urban area is estimated to decrease elderly migration from out of state by 0.0003 to 0.0005.

Bound, Jaeger and Baker (1995) present evidence that using instruments that are only weakly correlated with the endogenous explanatory variable may lead to inconsistent instrumental variables estimates, even if the correlation between the instruments and the error term in the main equation is very small. In addition, the finite-sample bias of the estimates approaches the OLS bias as the first-stage R squared approaches zero. They suggest that the F values and R squared statistics from the first stage equations be examined to help determine the validity of the instruments. Stock and Watson (2003) suggest that a first-stage F value greater than ten indicates an acceptable instrument. The F statistics from the first stages of the two-stage least squares regressions are 12.47 for the full sample and 13.28 for the urban subsample. The R squared values from the first stage regressions are 0.1885 and 0.2530, respectively, which are reasonable.

In Table 3-5, the variables of primary interest are those related to age, racial mismatch and migration. The elderly nonmover variable retains the positive estimates of the OLS specifications in all specifications, with a range in estimated elasticities of 0.11 to 0.15, which is quite close to the estimates in the OLS regressions. Again, the positive estimated elasticity suggests that elderly nonmovers are more likely to support education, compared to all residents under the age of 65. A 1 standard deviation increase in the log of the fraction of nonmovers increases revenues (which have a mean of approximately $4,500) by $158 to $232.

The estimated elasticities of the migration variables follow the predicted ordering in three of the four regressions. In the three-stage urban sample specification, the only migration variable that has an effect significantly different from zero is the nonmover

category. The estimated elasticity for the nonmovers in this specification is positive and significant, so the ordering is partially correct.

Table 3-5 Determinants of per pupil state and local revenue for education

County-level cross-section (1990), Two-stage and three-stage least squares regressions

	Two-stage least squares		Three-stage least squares	
Full sample	Elasticity	1 SD change in X	Elasticity	1 SD change in X
Fraction of the county's population that is aged 65 and older and that did not move between 1985 and 1990	0.1534	232.28	0.1362	205.66
	(0.0293)		(0.0180)	
Fraction of instate movers	0.0061		-0.0216	-62.57
	(0.0143)		(0.0090)	
Fraction of out of state movers	-0.0748	-241.43	-0.0462	-88.93
	(0.0251)		(0.0187)	
School districts per hundred thousand population	0.0519	319.58	0.0662	411.73
	(0.0115)		(0.0069)	
Fraction nonwhite	0.0030		0.0065	
	(0.0065)		(0.0043)	
Absolute value of the nonwhite share aged 5 to 17 less the nonwhite share aged 65 and older	-0.0062		-0.0044	
	(0.0063)		(0.0035)	
Median household income	0.3482	391.80	0.3484	392.03
	(0.0514)		(0.0303)	
Tax price	-0.2161	-106.97	-0.1129	-56.21
	(0.0754)		(0.0511)	
Fraction of the county's population aged 25 and older with at least some college	0.1079	148.85	0.0813	111.64
	(0.0303)		(0.0241)	
Per pupil federal revenue	-0.0081		-0.0351	-104.60
	(0.0223)		(0.0085)	
Fraction homeowner	-0.2272	-176.23	-0.2817	-217.44
	(0.0370)		(0.0272)	
Fraction urban	-0.0036	-106.97	-0.0037	-109.63
	(0.0008)		(0.0007)	
Urban subsample				
Fraction of the county's population that is aged 65 and older and that did not move between 1985 and 1990	0.1233	171.08	0.1144	158.43
	(0.0397)		(0.0244)	
Fraction of instate movers	0.0352		-0.0128	
	(0.0307)		(0.0231)	
Fraction of out of state movers	-0.0739	-434.95	-0.0401	
	(0.0414)		(0.0300)	

School districts per hundred thousand population	0.0492	262.66	0.0565	303.03
	(0.0131)		(0.0073)	
Fraction nonwhite	-0.0079		-0.0047	
	(0.0095)		(0.0075)	
Absolute value of the nonwhite share aged 5 to 17 less the nonwhite share aged 65 and older	0.0018		0.0014	
	(0.0063)		(0.0061)	
Median household income	0.4580	500.99	0.4330	472.12
	(0.0669)		(0.0392)	
Tax price	-0.2561	-117.34	-0.2047	-94.03
	(0.0900)		(0.0597)	
Fraction of the county's population aged 25 and older with at least some college	0.0996	129.24	0.0522	
	(0.0406)		(0.0333)	
Per pupil federal revenue	0.0700		0.0625	133.44
	(0.0370)		(0.0131)	
Fraction homeowner	-0.1686	-104.31	-0.1568	-97.05
	(0.0454)		(0.0362)	
Fraction urban	-0.0146		-0.0032	
	(0.0103)		(0.0097)	

All variables are in natural logarithms. All specifications include state dummies. Demographic and migration data are from 1990 and school finance data are from 1992. The full sample is made up of the 2520 counties from the 36 continental states that have a coefficient of variation of per pupil state plus local revenues greater than 0.1. The urban subsample is made up of the 1850 observations in the full sample for which the fraction rural is less than 1.

The elderly movers from out of state have negative and significant estimated elasticities in 3 of the 4 specifications; these estimates, at -0.04 to -0.07, are much larger than those from the ordinary least squares specifications (-0.01 for both samples). This suggests that the endogeneity of elderly location choice with respect to education spending is important in determining education spending. The dollar effects of a 1 standard deviation increase in the log of the fraction of inmigrants from out-of-state[19] range from -\$89 to -\$435 where they are significantly different from zero. These estimates are also much larger in absolute value than those obtained in the OLS

[19] Using the predicted standard deviations from the first stage regressions.

regressions (-$46 to -$75). Cross-cohort racial heterogeneity again has no effect in any specification.

The estimated elasticity for the number of school districts per hundred thousand persons in the population is positive and significant in all specifications, with a range of 0.05 to 0.07. This result is consistent, as in the OLS regressions, with the idea that support for education is likely to be higher where the community is smaller. The dollar effects associated with a 1 standard deviation increase in this variable range from a $263 to $412 increase in per pupil revenues.

The estimated effect of increased median household income is positive and significant in all specifications, with estimated elasticities ranging from 0.35 to 0.46. These elasticities are close to the ones found in the OLS specifications, and are larger for the urban sample in both specifications.

An increase in the nonwhite proportion of the population has no significant effect in any regression. This offers more evidence that median household income captures all of the effects of educational quality. The estimated elasticity of the tax price variable is negative and significant in all regressions, as we would expect of an own price elasticity. The price elasticities, which range from -0.11 to -0.26, are close to the OLS estimates. The dollar effects of a 1 standard deviation increase in the tax price variable range from -$56 to -$117.

An increase in the fraction of the adult population with at least some college education has a positive effect on per pupil revenues in 3 of the 4 specifications, with no significant effect in the three-stage urban regression. This positive effect is consistent with the idea that educational attainment is a signal of taste for education. The effects are

close to those found in the OLS specifications, with estimated elasticities ranging from 0.05 to 0.11 and estimated dollar effects of $111 to $149.

The estimated effect of an increase in the fraction of homeowners is negative and significant in all specifications, as it was in the OLS regressions. Again, this may be due to a renters' illusion effect, where renters do not believe property tax increases are borne by them, causing them to prefer higher school spending than otherwise identical homeowners. These estimated elasticities are somewhat smaller than those found in the OLS regressions; they range from -0.16 to -0.28 and have estimated dollar effects of -$97 to -$217.

Finally, an increase in the fraction of the population living in an urban area has a negative effect in the full-sample specifications. The estimated elasticity remains small at -0.004, and has an estimated 1 standard deviation effect of -$107 to -$110 on per pupil revenues where it is significant. The small size of the estimates is again likely due to the offsetting cost differences between urban and rural areas. The negative sign indicates that economy of scale effects and higher rural transportation costs dominate.

Conclusion

Previous researchers have found the proportion of elderly in an area to have a negative or insignificant effect on education spending. However, long-time older residents should be more willing to support education than new elderly residents if duration of residence fosters a sense of community. The results from my county-level cross-section model are consistent with this new idea of community-based altruism. An increase in the fraction of elderly nonmovers is shown to increase per-pupil spending, while the elderly who migrate from another state or county are less willing to support

education. This effect is especially large when instruments to control for Tiebout endogeneity are included, suggesting that controlling for this endogeneity is important when estimating school spending.

The effects of elderly migration on school spending have large estimated dollar effects on education spending compared to the effects of other variables commonly found in the literature. In the regressions controlling for Tiebout endogeneity, these effects are only slightly smaller in absolute value than the effects of household income and the number of districts per hundred thousand persons. They are close in magnitude to the effects of homeownership, and larger than the effects of adult educational attainment, the tax price of education and the fraction of the population living in an urban area.

I also find cross-cohort racial heterogeneity to have no significant effect on education spending. Racial differences may be a reason the elderly do not relate to the youth of a community, but my results indicate that long-term residence of the elderly may offset this potential source of discord.

Table A-1 Votes with 20% or greater contention, 1987 to 1998

Year	Vote number	Bill number	Bill name	Pro/ anti	Pro votes	Anti votes	Total votes
1987	152	HR 1451	Older Americans Act/Funding Levels *To reduce total authorizations under the bill for fiscal 1988 by $108 million*	A	297	95	
	154	HR 1451	Older Americans Act/Home Care *To authorize $4 million to test ways to assist seniors who receive home care*	P	273	116	
	171	HR 4	Housing and Community Development/Elderly Rents *To limit rent increases to elderly residents of subsidized housing*	P	284	137	
	279	HR 2470	Catastrophic Health Insurance Bill/Republican Substitute *This version would cost an estimated $18.2 billion, vs. $33.9 billion for original bill*	A	242	190	
	281	HR 2470	Catastrophic Health Insurance Bill/Passage *Passage of catastrophic coverage and other expansions (estimated cost of $33.9 billion)*	P	302	127	
	407	HR 1212	Polygraph Tests/Nursing Home Employees *Amendment to permit nursing home employers to use lie detector tests*	P	187	237	
	Number of votes				4	2	6
1988	176	HR 3436	Long-Term Health Care/Rule *To increase Medicare coverage of long-term home care services*	P	169	243	
	Number of votes				1	0	1
1990	436	H Con Res 310	Fiscal 1991 Budget Resolution/Conference Report *Same spending targets as in budget summit agreement, with smaller cuts in Medicare*	P	238	192	
	474	HR 5835	Fiscal 1991 Omnibus Reconciliation Act/Democratic Alternative *To provide smaller increases in Medicare premium and deductible, with other tax provisions*	P	250	164	
	Number of votes				2	0	2

Table A-1 continued

1991	70	H Con Res 121	Fiscal 1992 Budget Resolution/Spending Caps *Decreased damestic outlays, including $25.2 billian in Medicare cuts aver 5 years*	A	336	89	
	Number of votes				0	1	1
1995	50	H J Res 1	Balanced Budget Amendment/Recommit *To place Soc. Sec. trust funds aff budget and exempt them from balanced budget calculatians*	P	184	247	
	69	HR 5	Unfunded Mandates/Older Americans and Juvenile Justice *Ta exempt mandates related ta Older Americans and Juvenile Justice Acts*	P	126	296	
	301	HR 483	Medicare Demonstration Program Expansion/Waxman Substitute *To bar age-based premium increases, allaw individuals to switch back ta fee-far-service plan*	P	175	246	
	355	HR 483	Medicare Select Policies/Motion to Instruct Conferees *Reminder af fiscal limitatians in extending Medicare Select policies*	A	224	197	
	458	H Con Res 67	Fiscal 1996 Concurrent Budget Resolution/Adoption *Budget balance by 2002 via $894 billian spending cuts, including $270 billian fram Medicare*	A	194	239	
	729	HR 2425	Medicare Revisions/Democratic Substitute *Medicare reductians af $90 billian over 7 years (Republican bill called far $270 billian cuts)*	P	149	283	
	730	HR 2425	Medicare Revisions/Motion to Recommit *Ta remave Medicare Part B premium increases from legislatian*	P	183	249	
	731	HR 2425	Medicare Revisions/Passage *Medicare reductions af $270 billion aver 7 years*	A	201	231	
	742	HR 2491	1995 Budget – Reconciliation/Recommit *Instructians ta pratect the health and income security af children and the elderly*	P	180	250	
	743	HR 2491	1995 Budget – Reconciliation/Passage *Cut spending by $900 billian aver 7 years, including $270 billian in Medicare cuts*	A	203	227	
	Number of votes				6	4	10

Table A-1 continued

1996	156	HR 2406	Housing Overhaul/Family Rent Cap *Rent cap for subsidized housing for elderly and disabled residents*	P	196	221	
	291	HR 3675	Fiscal 1997 Transportation Appropriations/Commercial Pilot Retirement *Prohibit money for a study of whether the mandatory retirement age for pilots should be raised*	A	159	247	
	Number of votes				1	1	2
1997	102	HR 2	Public Housing System Overhaul/Community Service Exemption *Exempt primary caregivers of young children and the elderly from service requirement in subsidized housing*	P	181	216	
	300	HR 2003	Budget Enforcement/Recommit *To take Soc. Sec off budget and limit Medicare Part B premium increases*	P	148	279	
	Number of votes				2	0	2
1998	115	HR 3546	National Dialogue on Social Security/Recommit *Reserve budget surplus until Soc. Sec is solvent for the future*	P	174	236	
	463	HR 4578	Surplus to Social Security/Social Security Trust Fund *To transfer all Soc. Sec. Trust Fund surpluses to be held in trust for Soc. Sec.*	P	210	216	
	464	HR 4578	Surplus to Social Security/Passage *Set aside 90% of any budget surplus in a special account until Soc. Sec. solvent for the future*	A	188	240	
	468	HR 4579	Tax Cuts/Democratic Substitute *Prohibit tax cuts from taking effect until Soc. Sec. solvent for the future*	P	197	227	
	Number of votes				3	1	4
Total Votes:					19	9	28

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August 2003

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